Outdoor Hog Production

Best Practices for Resource Conservation in the San Francisco Bay Area

Hog Manure Management

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Hog manure and bedding from outdoor production systems can typically be treated as a solid and may be managed in several ways depending on the structure of the operation. In the Bay Area, outdoor production systems, even when pasture or rangeland -based, typically include a drylot. Periodic removal of hog manure is essential in a drylot to protect water resources, reduce pathogens and avoid nutrient accumulation. Composting can recycle hog manure and bedding in an environmentally friendly and sustainable manner.

Rotational Pasture, Range and Cropland–based Systems

In systems where hogs are moved through pasture, range or cropland, manure is typically distributed and in many cases is viewed as a beneficial nutrient to promote forage or crop growth. However, because hogs are monogastrics and rely on grain or other nutrient dense feeds typically imported from off the farm, their manure contributes additional nutrients to the farm system which can result in nutrient loading. This is different from ruminants that can rely purely on forage, therefore recycling existing nutrients from on-site forage in their manure without adding any to the system.

The degree to which outdoor hog manure is sufficiently distributed to minimize nutrient loading depends on the stocking rate and how frequently the animals are moved. See factsheet on Rangeland and Pasture Management for more information. In many cases, hogs will select a particular area to dung in, resulting in a higher concentration of nutrients in that area. For this reason, it is recommended that outdoor hog farmers monitor nutrients through periodic soil testing.

Animal waste storage system. Photo courtesy of the Alameda County RCD.

Drylot Systems

In drylot systems, by comparison, manure is less likely to be distributed, as the area within which the animals are housed is smaller and stocking rates are higher. As such, the collection and removal of

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manure is more manageable and in many cases, imperative to the well-being of the animals. This factsheet focuses on composting hog manure and bedding from confined or drylot hog systems as a means of reducing the volume of waste, minimizing flies, pathogens and odors and potentially producing a high quality soil amendment.

Composting Hog Waste

Collection of material

Collecting manure is the initial step to develop a successful composting system. Since hogs often dung in one place, collecting material may be simplified by encouraging hogs to dung in the best location for collection and in area that does not receive runoff. The manure may be scraped from the ground in a drylot system or removed with bedding from a concrete or hoop house arrangement. During the rainy season it may be necessary to scrape drylots twice weekly. Rain runoff from drylots may become contaminated and should never flow directly into a waterway. Although scraping removes most of the solids, any runoff from a drylot should pass through a vegetative buffer before reaching a waterway to minimize the possibility of contaminating water with nutrients or pathogens.

It is important to know the moisture content and the initial bulk density of the waste to determine whether a bulking agent is necessary. If the material is excessively moist (>60%) such as a slurry or liquid material without a litter component, a bulking agent may be necessary.

Bulking agents are carbon-based material that add volume to the manure, soak up any excess liquid and balance the C/N ratio necessary to produce high quality compost. Examples of effective bulking agents include: straw, sawdust, peat moss or wood chips. The manure must be mixed evenly throughout the bulking agent to ensure consistency of the final product.

Storage

The location and site where the manure is stored is critical for the stability of the material as well as the reduction of potential environmental contaminants. Once collected, manure must remain covered. Allowing the material to come into contact with rain will increase the amount of nutrient and possibly pathogenic contaminants running off the pile or leaching into surface or groundwater. In addition to posing environmental concerns, the loss of nutrients from a compost pile also results in a decrease of nitrogen retention within the final compost product.

Initially, raw un-composted manure should be kept under a covered area or tarp if possible. The ground on which the manure is stored should be impermeable, such as hard packed earth or cement, with the intention of prohibiting leachate from penetrating the soil profile as well as controlling runoff. A minor grade in the storage surface is favorable in order to collect runoff in a specific location, such as a collection lagoon or biological filtration pool. It is imperative that manure or leachate is not stored near water sources or allowed to flow freely into waterways.

Turned Windrow method. Photo courtesy of NRCS

Compost method

Active v. Passive Aerated Windrows

Aerated composting, either active or passive, is a method designed to provide the composting material with even air pressure throughout the pile, with the volume of airflow often determining the amount of time necessary to complete the process. The more oxygen the material receives during composting the faster the material will break down to become a finished product. Active aeration methods include using powered fans to force air through a series of perforated pipes, evenly distributing oxygen throughout the material. Passive aeration, often a more affordable method than active aeration, consists of placing perforated Schedule 80 PVC pipe evenly throughout the pile. In both active and

passively aerated piles the material should be turned once a month, moving the outer material towards the center of the pile. The pipes may need to be removed prior to turning in an active aerated pile.

Turned Windrow method

Windrow composting is a method in which the manure/bulking agent mixture is piled in long rows, with a minimum size of at least 3ft x 3ft x 3ft and actively turned by hand, tractor bucket or windrow turner for larger piles. To achieve even decomposition throughout the pile the material mixture should be as homogenous as possible, with a moisture content between 65 – 55%. The frequency of turning will determine the speed of decomposition; the more frequently a material is turned the faster the material will compost. Turn approximately every two weeks, based on moisture and temperature to produce compost in a timely manner. Material is considered mature in approximately 49 days using this method.

Finished compost ready for application: photo courtesy of NRCS

Requirements for Safety

Any animal, including hog manure, contains pathogens that can be harmful to human health; precautions must be taken to ensure that the material is safely composted. To kill harmful pathogens it is imperative that the material reaches 55°C (130°F) for at least 3 days. A 3' foot compost thermometer is useful to monitor temperature. In the Bay Area, due to dry climatic conditions, maintaining moisture within the material is imperative to achieving proper sterilizing temperatures. The location of the pile should be out of direct sun to prevent excess moisture loss. These temperatures can be achieved via the methods mentioned above if followed properly. A critical factor in pathogen elimination is that all of the material being composted is exposed to the required high temperatures. This can be achieved by adequately turning the material, making sure to mix the outer material thoroughly into the center.

Use of Product

Once maturity is reached (~7 weeks) the product can be safely used. Visual indicators such as steam no longer rising from the pile can also determine maturity. Properly finished, mature compost can be applied to pastures and fields to increase fertility and soil organic matter. Application rates for compost vary based on the intended outcome, but generally 1-2 inches is sufficient. If compost is being incorporated into the soil profile it should be incorporated at a depth of approximately 5 inches. Due to the risk of pathogen contamination from unfinished processing, compost should not be applied to ground-harvested crops (ie. strawberries, root-crops, squash).

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